

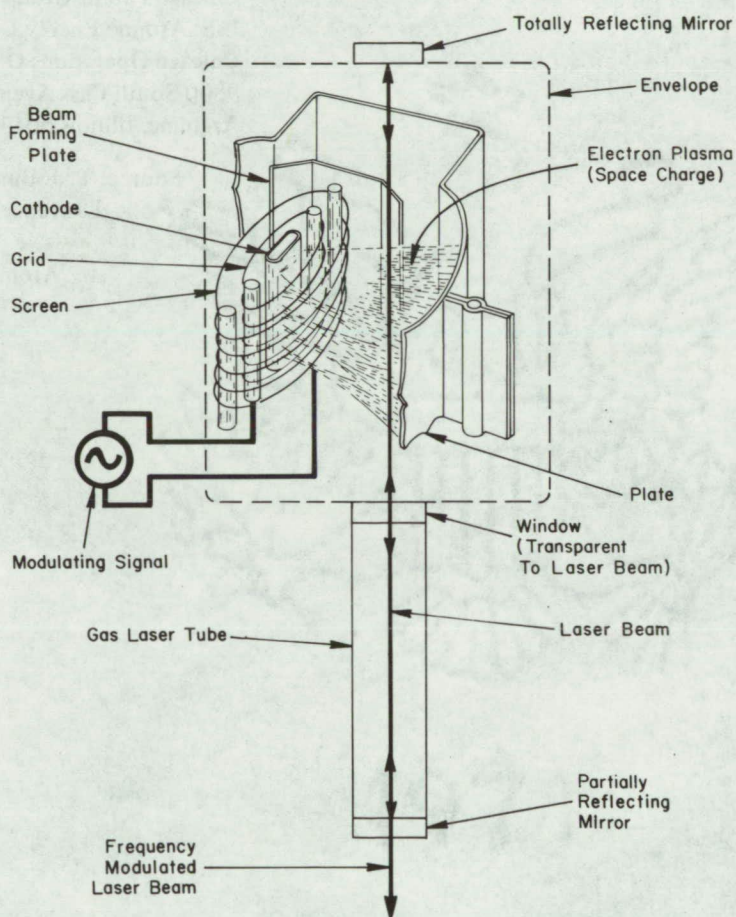


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Laser Frequency Modulation With Electron Plasma



Frequency modulating a laser beam with an electron plasma yields an information bandwidth on the order of 10^9 Hz. This is an improvement of at least an order of magnitude over conventional crystal modulators.

When a laser beam is passed through an electron plasma its frequency is shifted by an amount proportional to the plasma density. This density is varied with a modulating signal resulting in a corresponding modulation.

(continued overleaf)

tion of the laser beam frequency. The necessary apparatus is relatively inexpensive since crystals are not required.

One method of varying the electron plasma density is illustrated. The electron density in the space charge region of a vacuum tube is varied by applying a modulating signal to the tube grid. The laser beam is passed through this space charge region. The tube envelope has a window transparent at the laser frequency and a totally reflecting mirror to direct the beam back through the plasma, thus, the frequency of the laser beam is modulated in accordance with the signal applied to the tube grid.

The voltage on the tube grid is about three orders of magnitude less than that required for crystal modulators.

Note:

Requests for further information may be directed to:

Mr. Glenn K. Ellis
Technology Utilization Officer
Office of Information Services
U.S. Atomic Energy Commission
Washington, D.C. 20545
Reference: TSP72-10373

Patent status:

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Mr. George H. Lee, Chief
Chicago Patent Group
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Source: T. J. Burgess and V. R. Latorre
Lawrence Radiation Laboratory
under contract to
Atomic Energy Commission
(AEC-10079)